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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/771,290 | 02/05/2004 | Chandra Mouli | M4065.0556/P556-A | 3228 |
| 24998 | 7590 | 01/11/2007 | EXAMINER | |
| DICKSTEIN SHAPIRO LLP 1825 EYE STREET NW Washington, DC 20006-5403 | | | PERKINS, PAMELA E | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2822 | |
| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE | | |
| 3 MONTHS | 01/11/2007 | PAPER | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

| | | |
|------------------------------|--------------------------------------|-------------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/771,290 | MOULI ET AL. |
| | Examiner Pamela E. Perkins | Art Unit 2822 |

— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 28 September 2006.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 98-135 is/are pending in the application.
- 4a) Of the above claim(s) 102-106, 124-126 and 135 is/are withdrawn from consideration.
- 5) Claim(s) 107-123 and 127-134 is/are allowed.
- 6) Claim(s) 98-101 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

DETAILED ACTION

This office action is in response to the filing of the election on 28 September 2006. Claims 98-135 are pending.

Election/Restrictions

Applicant's election without traverse of species group I drawn to a method of forming an image sensor in the reply filed on 28 September 2006 is acknowledged.

Claims 102-106, 124-126 and 135 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species group II, there being no allowable generic or linking claim. Election was made without traverse in the reply filed on 28 September 2006.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 98-101 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nozaki et al. (6,570,222) in view of Gonzalez et al. (2001/0016378).

Nozaki et al. discloses forming a CMOS image sensor comprising forming a pixel within a substrate and forming an isolation region adjacent the pixel (Fig. 7, col. 8, lines 3-25, col. 13, lines 24-30). Nozaki et al. discloses forming an isolation region around at

least a portion of the pixel and forming an isolation gate (13b) over at least a portion of the isolation region (STI) (Fig. 7, col. 8, lines 3-25).

Nozaki et al. also describes the pixel further comprises at least one transistor gate (24b) for transferring photoelectric charges from said photosensitive region (34a, 34b) and wherein said isolation gate is of the same conductivity type one transistor gate; wherein said photosensitive region, comprises a p-type conductivity substrate (11), an n-type conductivity photodiode region (15); and a p-type conductivity surface region (21) (column 1, line 35 to column 3, line 35).

Furthermore, Nozaki discloses an active layer of a first conductivity type formed within a substrate (Figure 1); one transistor gate (13a) formed over a portion of said active layer (Fig. 7); a photosensor (34a) formed adjacent said transistor gate; an isolation region (STI) formed in said active layer adjacent to said photosensor; and an isolation gate (13b) formed over at least a portion of said isolation region (Fig. 7); wherein said photosensor comprises a p-n-p junction region formed under said one transistor gate (Fig. 23); said p-n-p junction region comprising a surface layer (21) of a first conductivity type overlying a photosensitive region of a second conductivity type (15); said photosensitive region overlying said active layer of said first conductivity type (col. 14, lines 1-65).

In addition, Nozaki et al. teaches forming an output transistor for reading out charge from the floating diffusion region, forming a read out circuit comprising at least the output transistor, and forming a photodiode (col. 14, lines 1-52). Nozaki discloses a pixel (Fig. 7) for receiving incident photo energy and converting it into an electrical

signal; said pixel comprising: a photosensitive area (34a) for accumulating photo-generated charge; a floating diffusion region adjacent a side of said photosensitive region (figure 23) for receiving charge from said photosensitive area; a read out circuit comprising at least an output transistor (13a) for reading out charge from said floating diffusion region; an isolation region (STI) formed around a portion of said pixel; and an isolation gate (13b) formed over at least a portion of said isolation region (col. 2, lines 7-65, col. 3, lines 1-65, col. 4, lines 1-65, col. 8, lines 3-65). Nozaki et al. teaches minimizing leakage, noise, and dark current (col. 8, lines 53-65, col. 11, lines 1-18).

Nozaki does not disclose the wherein the isolation gate extending beyond the isolation region.

Gonzalez et al. disclose a method of forming a semiconductor device where an active region (23) is formed adjacent to an isolation region (26); and forming an isolation gate (42) in a portion of the isolation region, wherein the isolation gate (42) extends beyond the isolation region (23) (Fig. 12; para. 24 & 30).

Since Nozaki and Gonzalez et al. are both from the same field of endeavor, a method of forming a semiconductor device, the purpose disclosed by Gonzalez et al. would have been recognized in the pertinent art of Nozaki. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Nozaki by he isolation gate extending beyond the isolation region as taught by Gonzalez et al. to decrease the current leakage and improve transistor performance (para. 3, 4).

Allowable Subject Matter

Claims 107-123 and 107-132 are allowed.

The following is a statement of reasons for the indication of allowable subject matter: referring to claim 107, prior art does not anticipate, teach, or suggest forming an isolation gate over at least a portion of the active layer substantially surrounding the photosensor.

Referring to claim 119, prior art does not disclose, anticipate, teach, or suggest forming an isolation gate over at least a portion of the isolation regions; wherein the isolation gate substantially surrounds the pixel.

Referring to claim 132, prior art does not disclose, anticipate, teach or suggest forming an isolation gate over at least a portion of the active layer adjacent the photosensor; and biasing the isolation gate with a voltage.

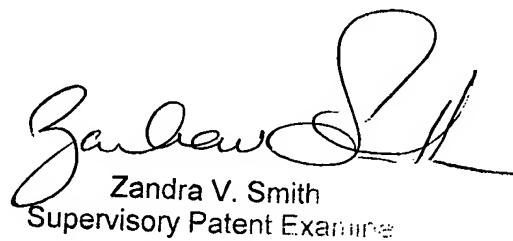
Conclusion

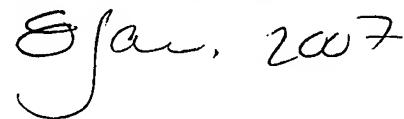
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E. Perkins whose telephone number is (571) 272-1840. The examiner can normally be reached on Monday thru Friday, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on (571) 272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Pep
7 January 2007


Zandra V. Smith
Supervisory Patent Examiner


Jan, 2007